

AMENDMENTS TO THE CLAIMS

The following Listing of Claims should be entered to replace all prior listings of claims in this application. In accordance with Rule 121, the status of each claim is indicated parenthetically. As can be seen in this listing, the Applicant amends all claims. Applicant also adds new claims 174-184 to this application. Thus, claims 1, 2, 5-12, 16-29, and 165-184 remain in this application. Each amendment is believed to have been made in accordance with Rule 121, however, should any unintended informality exist, it is requested that the undersigned be contacted by telephone so that it may be resolved as expediently as possible.

LISTING OF CLAIMS

1. (Currently Amended)
A method of producing a nonhuman mammal comprising the steps of:
 - a. collecting sperm cells from a male of a nonhuman species of mammal;
 - b. establishing a sperm cell source which supplies nonhuman sperm cells to be separated;
 - c. sensing a sex characteristic of said nonhuman sperm cells;
 - d. separating nonhuman sperm cells based upon said sex characteristic;
 - e. establishing an insemination sample having a low number of separated nonhuman sperm cells capable of fertilizing at least one egg within said female of said nonhuman species of said mammal at success levels comparable to a typical insemination dosage;
 - f. inserting a portion of said insemination sample into a female of said nonhuman species of said mammal;
 - g. fertilizing at least one egg within said female of said nonhuman species of said mammal; and
 - h. ~~producing an~~producing a non-human offspring mammal.
2. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 1 wherein said step of establishing an insemination sample having a low number of separated nonhuman sperm cells capable of fertilizing at least one egg within said female of said nonhuman species of said mammal at success levels comparable to a typical insemination dosage comprises establishing an insemination sample having a low number of separated nonhuman sperm cells capable of fertilizing at least one egg within said female of said nonhuman species at success levels selected from the group consisting of at least 35%, at least 41%, at least 50%, and at least 90%.

3-4. (Cancelled)

5. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 1 wherein said female of said nonhuman species of said mammal has uterine horns and wherein said step of inserting a portion of said insemination sample into said female of said nonhuman species of said mammal comprises the step of inserting said portion of said insemination sample both ipsi- and contra-lateral within the uterine horns of said female of said nonhuman species of said mammal.

6. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 1 wherein said female of said nonhuman species of said mammal has at least one uterine horn and wherein said step of inserting said portion of said insemination sample into said female of said nonhuman species of said mammal comprises the step of inserting said portion of said insemination sample deep within said uterine horn.

7. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 5 wherein said step of inserting said portion of said insemination sample into a female of said nonhuman species of said mammal further comprises the step of inserting said portion of said insemination sample deep within said uterine horns.

8. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 6 wherein said step of inserting said portion of said insemination sample into a female of said nonhuman species of said mammal further comprises the step of inserting said portion of said insemination sample within said uterine horn through the use of embryo transfer equipment.

9. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 7 wherein said step of inserting said portion of said insemination sample into a female of said nonhuman species of said mammal further comprises the step of inserting said portion of said insemination sample within said uterine horns through the use of embryo transfer equipment.

10. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 5 wherein said step of inserting said portion of said insemination sample into a female of said nonhuman species of said mammal comprises the step of inserting said portion of said insemination sample twelve hours after the time which is generally regarded as optimal for a single insemination.

11. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 9 wherein said step of inserting said portion of said insemination sample

into a female nonhuman species of said mammal occurs not later than about seventeen hours from said step of establishing an insemination sample having a low number of separated nonhuman sperm cells capable of fertilizing at least one egg within said female of said species of said mammal at success levels comparable to a typical insemination dosage.

12. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 9 wherein said step of inserting said portion of said insemination sample into a female of said nonhuman species of mammal occurs not later than about ten hours from said step of establishing said insemination sample.

13-15. (Cancelled)

16. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 1 further comprising the steps of:

- a. providing a flow cytometer;
- b. establishing a sheath fluid for said nonhuman sperm cells; and
- c. collecting said nonhuman sperm cells having the desired sex characteristic.

17. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 16 wherein said step of collecting said nonhuman sperm cells having the desired sex characteristic further comprises the step of cushioning said nonhuman sperm cells from impact with a collector.

18. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 16 wherein said step of providing a flow cytometer comprises the step of

providing a high speed sorting flow cytometer, wherein said high speed sorting flow cytometer separates said sperm cells at a rate of greater than 500 sorts per second.

19. (Currently Amended)

A method of producing a nonhuman mammal as described in ~~claim 3~~ claim 1 further comprising the step of using an ovulatory pharmaceutical to cause multiple eggs to be produced.

20. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 19 wherein said ovulatory pharmaceutical is injected in half day increments between any of days 2 to 18 of the estrus cycle.

21. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 20 wherein said step of using an ovulatory pharmaceutical to cause multiple eggs to be produced comprises the step of injecting a dosage of follicle stimulating hormone.

22. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 21 wherein said step of injecting said dosage of follicle stimulating hormone in approximately half day increments comprises a dosage level of 6, 6, 4, 4, 2, 2, 2, and 2 mg between days 9 and 12 inclusive of the estrus cycle and further comprising the step of injecting 25 mg and 12.5 mg of prostaglandin F-2-alpha on the sixth and seventh dosages, respectively, of said follicle stimulating hormone.

23. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 16 further comprising the step of staining said nonhuman sperm cells of said male of said species of mammal with at least about 38 micro-molar concentration of stain.

24. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 16 further comprising the step of chemically coordinating a sheath fluid environment for sperm cells which is coordinated with both pre-sort and post-sort sperm cell fluid environments.

25. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 1, 2, 16, 17 or 18 wherein collecting sperm cells from a male of a nonhuman species of mammal comprises collecting said sperm cells from a male of a nonhuman species selected from the group consisting of bovines, and equines.

26. (Currently Amended)

A method of producing a nonhuman mammal as described in ~~claim 25~~claim 16 or claim 24 wherein said step of chemically coordinating a sheath fluid to create a sheath fluid environment for said nonhuman sperm cells which is coordinated with both a pre-sort and a post-sort cell fluid environments comprises the step of establishing a cell source which supplies bovine sperm cells and the step of establishing a sheath fluid which contains about 2.9% sodium citrate.

27. (Currently Amended)

A method of producing a nonhuman mammal as described in ~~claim 25~~claim 16 or claim 24 wherein said step of chemically coordinating a sheath fluid to create a sheath fluid environment for said cells which is

coordinated with both a pre-sort and a post-sort cell fluid environment comprises the step of establishing a cell source which supplies equine sperm cells and the step of establishing a sheath fluid which contains a hepes buffered medium.

28. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 16 wherein said step of collecting said nonhuman sperm cells having the desired sex characteristic further comprises the step of avoiding impact of said nonhuman sperm cells with a collector.

29. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 28 wherein said step of avoiding impact of said nonhuman sperm cells with said collector comprises the step of providing a collection container having a diameter of at least fifteen millimeters.

30-164. (Cancelled)

165. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 28 wherein said step of avoiding impact of said nonhuman sperm cells with said collector comprises the step of providing a collection container having stream matched physical characteristics.

166. (Currently Amended)

A method of producing a nonhuman mammal as described in claim 16 wherein said step of collecting said nonhuman sperm cells having the desired sex characteristic further comprises the step of providing a citrate collection fluid containing about six percent egg yolk prior to commencing said step of collecting.

167. (Currently Amended)
A method of producing a nonhuman mammal as described in claim 18 further ~~comprises~~comprising the step of operating said flow cytometer ~~with in~~within the range of about 5 kilohertz to about 50 kilohertz.
168. (Currently Amended)
A method of producing a nonhuman mammal as described in ~~claim 185~~in claim 18, claim 174, claim 175, claim 176, claim 177, claim 178, claim 179, claim 181, claim 182, or claim 183 further ~~comprises~~comprising the step of separating said sperm cells at a rate of at least 1200 sorts per second.
169. (Currently Amended)
A method of producing a nonhuman mammal as described in ~~claim 3~~claim 1 wherein said step of establishing an insemination sample having a low number of separated nonhuman sperm cells capable of fertilizing at least one egg within said female of said nonhuman species of said mammal at success levels comparable to a typical insemination dosage comprises the step of establishing an insemination sample selected from the group consisting of: a bovine insemination sample of no more than one hundred thousand sperm cells, a bovine insemination sample of no more than two hundred fifty thousand sperm cells, a bovine insemination sample of no more than three hundred thousand sperm cells, an equine insemination sample of no more than one million sperm cells, an equine insemination sample of no more than five million sperm cells, an equine insemination sample of no more than ten million sperm cells, and an equine insemination sample of no more than twenty-five million sperm cells.
170. (Currently Amended)

A method of producing a nonhuman mammal as described in ~~claim 4~~claim 1 wherein said step of inserting a portion of said insemination sample into a female of said nonhuman species of said mammal and said step of fertilizing at least one egg within said female of said nonhuman species of said mammal occurs in a field environment.

171. (Currently Amended)

A method of producing a nonhuman mammal as described in ~~claim 14~~claim 170 wherein said step of inserting said portion of said insemination sample into a female of said nonhuman species of said mammal comprises inserting a portion of an insemination sample wherein a substantial portion of said separated nonhuman sperm cells have the desired sex characteristic.

172. (Currently Amended)

A method of producing a nonhuman mammal as described in ~~claim 189~~claim 171 wherein said step of inserting a portion of an insemination sample wherein a substantial portion of said separated nonhuman sperm cells have the desired sex characteristic comprises selecting said insemination sample from a group consisting of an insemination sample wherein at least 60 percent of said separated nonhuman sperm cells have the desired sex characteristic, an insemination sample wherein at least 70 percent of said nonhuman sperm have the desired sex characteristic, an insemination sample wherein at least 80 percent of said nonhuman sperm have the desired sex characteristic, and an insemination sample wherein at least 90 percent of said nonhuman sperm have the desired sex characteristic.

173. (Currently Amended)

A method of producing a nonhuman mammal as described in ~~claim 190~~claim 172 wherein said step of ~~producing an~~producing a nonhuman

offspring mammal comprises producing a predetermined sex ratio of fetuses.

174.

(New)

A method of producing a nonhuman mammal comprising the steps of:

- a. collecting sperm cells from a male of a nonhuman species of mammal;
- b. establishing a sperm cell source which supplies nonhuman sperm cells to be separated;
- c. sensing a sex characteristic of said nonhuman sperm cells;
- d. separating nonhuman sperm cells based upon said sex characteristic;
- e. establishing an insemination sample having a low number of separated nonhuman sperm cells capable of fertilizing at least one egg within said female of said nonhuman species of said mammal at success levels comparable to a typical insemination dosage;
- f. inserting a portion of said insemination sample into a female of said nonhuman species of said mammal not later than about twelve hours after the time which is generally regarded as optimal for a single insemination;
- g. fertilizing at least one egg within said female of said nonhuman species of said mammal; and
- h. producing a nonhuman offspring mammal.

175.

(New)

A method of producing a nonhuman mammal comprising the steps of:

- a. collecting sperm cells from a male of a nonhuman species of mammal;
- b. establishing a sperm cell source which supplies nonhuman sperm cells to be separated;
- c. sensing a sex characteristic of said nonhuman sperm cells;
- d. separating nonhuman sperm cells based upon said sex characteristic;

- e. establishing an insemination sample having a low number of separated nonhuman sperm cells capable of fertilizing at least one egg within said female of said nonhuman species of said mammal at success levels comparable to a typical insemination dosage;
- f. inserting a portion of said insemination sample into a female of said nonhuman species of said mammal not later than about seventeen hours from said step of establishing an insemination sample having a low number of separated sperm cells capable of fertilizing at least one egg within said female of said nonhuman species of said mammal at success levels comparable to a typical insemination dosage;
- g. fertilizing at least one egg within said female of said nonhuman species of said mammal; and
- h. producing a nonhuman offspring mammal.

176.

(New)

A method of producing a nonhuman mammal comprising the steps of:

- a. collecting sperm cells from a male of a nonhuman species of mammal;
- b. establishing a sperm cell source which supplies nonhuman sperm cells to be separated;
- c. sensing a sex characteristic of said nonhuman sperm cells;
- d. separating nonhuman sperm cells based upon said sex characteristic;
- e. establishing an insemination sample having a low number of separated nonhuman sperm cells capable of fertilizing at least one egg within said female of said nonhuman species of said mammal at success levels comparable to a typical insemination dosage;
- f. inserting a portion of said insemination sample into a female of said nonhuman species of said mammal later than about ten hours from said step of establishing said insemination sample;
- g. fertilizing at least one egg within said female of said nonhuman species of said mammal;
- h. producing a nonhuman offspring mammal.

177.

(New)

A method of producing a nonhuman mammal comprising the steps of:

- a. collecting nonhuman sperm cells from a male of a nonhuman species of mammal selected from the group consisting of bovines and equines;
- b. establishing a sperm cell source which supplies nonhuman sperm cells to be separated in a sheath fluid that contains a hepes buffered medium;
- c. sensing a sex characteristic of said nonhuman sperm cells;
- d. separating nonhuman sperm cells based upon said sex characteristic;
- e. establishing an insemination sample having a low number of separated nonhuman sperm cells capable of fertilizing at least one egg within said female of said nonhuman species of said mammal at success levels comparable to a typical insemination dosage;
- f. inserting a portion of said insemination sample into a female of said nonhuman species of said mammal;
- g. fertilizing at least one egg within said female of said nonhuman species of said mammal; and
- h. producing a nonhuman offspring mammal.

178.

(New)

A method of producing a nonhuman mammal comprising the steps of:

- a. collecting sperm cells from a male of a nonhuman species of mammal;
- b. establishing a sperm cell source which supplies nonhuman sperm cells to be separated;
- c. sensing a sex characteristic of said nonhuman sperm cells;
- d. separating nonhuman sperm cells based upon said sex characteristic utilizing a collection container having a diameter of at least fifteen millimeters;

- e. establishing an insemination sample having a low number of separated nonhuman sperm cells capable of fertilizing at least one egg within said female of said nonhuman species of said mammal at success levels comparable to a typical insemination dosage;
- f. inserting a portion of said insemination sample into a female of said nonhuman species of said mammal;
- g. fertilizing at least one egg within said female of said nonhuman species of said mammal; and
- h. producing a nonhuman offspring mammal.

179.

(New)

A method of producing a nonhuman mammal comprising the steps of:

- a. collecting sperm cells from a male of a nonhuman species of mammal;
- b. establishing a sperm cell source which supplies nonhuman sperm cells to be separated;
- c. sensing a sex characteristic of said nonhuman sperm cells;
- d. separating nonhuman sperm cells based upon said sex characteristic utilizing a collection container having stream matched physical characteristics;
- e. establishing an insemination sample having a low number of separated nonhuman sperm cells capable of fertilizing at least one egg within said female of said nonhuman species of said mammal at success levels comparable to a typical insemination dosage;
- f. inserting a portion of said insemination sample into a female of said nonhuman species of said mammal;
- g. fertilizing at least one egg within said female of said nonhuman species of said mammal; and
- h. producing a nonhuman offspring mammal.

180.

(New)

A method of producing a nonhuman mammal comprising the steps of:

- a. collecting sperm cells from a male of a nonhuman species of mammal;
- b. establishing a sperm cell source which supplies nonhuman sperm cells to be separated;
- c. sensing a sex characteristic of said nonhuman sperm cells;
- d. separating nonhuman sperm cells based upon said sex characteristic and a rate of at least 1200 sorts per second;
- e. establishing an insemination sample having a low number of separated nonhuman sperm cells capable of fertilizing at least one egg within said female of said nonhuman species of said mammal at success levels comparable to a typical insemination dosage;
- f. inserting a portion of said insemination sample into a female of said nonhuman species of said mammal;
- g. fertilizing at least one egg within said female of said nonhuman species of said mammal; and
- h. producing a nonhuman offspring mammal.

181. (New)

A method of producing a nonhuman mammal comprising the steps of:

- a. collecting sperm cells from a male of a nonhuman species of mammal;
- b. establishing a sperm cell source which supplies nonhuman sperm cells to be separated;
- c. sensing a sex characteristic of said nonhuman sperm cells;
- d. separating nonhuman sperm cells based upon said sex characteristic;
- e. establishing an insemination sample having a low number of separated nonhuman sperm cells capable of fertilizing at least one egg within said female of said nonhuman species of said mammal at success levels comparable to a typical insemination dosage, wherein said step of establishing an insemination sample comprises the step of establishing an insemination sample selected from the group consisting of: a bovine insemination sample of no more than one hundred thousand sperm cells, a bovine insemination sample of no more than

two hundred fifty thousand sperm cells, a bovine insemination sample of no more than three hundred thousand sperm cells, an equine insemination sample of no more than one million sperm cells, an equine insemination sample of no more than five million sperm cells, an equine insemination sample of no more than ten million sperm cells, and an equine insemination sample of no more than twenty-five million sperm cells;

- f. inserting a portion of said insemination sample into a female of said nonhuman species of said mammal;
- g. fertilizing at least one egg within said female of said nonhuman species of said mammal; and
- h. producing a nonhuman offspring mammal.

182.

(New)

A method of producing a nonhuman mammal comprising the steps of:

- a. collecting sperm cells from a male of a nonhuman species of mammal;
- b. establishing a sperm cell source which supplies nonhuman sperm cells to be separated;
- c. sensing a sex characteristic of said nonhuman sperm cells;
- d. separating nonhuman sperm cells based upon said sex characteristic;
- e. establishing an insemination sample having a low number of separated nonhuman sperm cells capable of fertilizing at least one egg within said female of said nonhuman species of said mammal at success levels comparable to a typical insemination dosage;
- f. inserting a portion of said insemination sample into a female of said nonhuman species of said mammal, having a desired sex characteristic selected from a group consisting of an insemination sample wherein at least 80 percent of said nonhuman sperm have the desired sex characteristic, and an insemination sample wherein at least 90 percent of said nonhuman sperm have the desired sex characteristic;

- g. fertilizing at least one egg within said female of said nonhuman species of said mammal; and
- h. producing a nonhuman offspring mammal.

183.

(New)

A method of producing a nonhuman mammal comprising the steps of:

- a. collecting sperm cells from a male of a nonhuman species of mammal;
- b. establishing a sperm cell source which supplies nonhuman sperm cells to be separated;
- c. sensing a sex characteristic of said nonhuman sperm cells;
- d. separating nonhuman sperm cells based upon said sex characteristic through use of a flow cytometer;
- e. establishing an insemination sample having a low number of separated nonhuman sperm cells capable of fertilizing at least one egg within said female of said nonhuman species of said mammal at success levels comparable to a typical insemination dosage;
- f. inserting a portion of said insemination sample into a female of said nonhuman species of said mammal, having a desired sex characteristic selected from a group consisting of an insemination sample wherein at least 60 percent of said separated sperm cells have the desired sex characteristic, an insemination sample wherein at least 70 percent of said sperm have the desired sex characteristic, an insemination sample wherein at least 80 percent of said sperm have the desired sex characteristic, and an insemination sample wherein at least 90 percent of said sperm have the desired sex characteristic;
- g. fertilizing at least one egg within said female of said nonhuman species of said mammal; and
- h. producing a nonhuman offspring mammal.

184

(New)

A method of producing a nonhuman mammal as described in claim 174, claim 175, claim 176, claim 177, claim 178, claim 179, claim 180, claim 181, claim 182, or claim 183 wherein said step of establishing an insemination sample having a low number of separated nonhuman sperm cells capable of fertilizing at least one egg within said female of said nonhuman species of said mammal at success levels comparable to a typical insemination dosage comprises establishing an insemination sample having a low number of separated nonhuman sperm cells capable of fertilizing at least one egg within said female of said nonhuman species at success levels selected from the group consisting of at least 35%, at least 41%, at least 50%, and at least 90%.